

R E M A R K S

This is in response to the Office Action that was mailed on July 14, 2003. Claims 2, 8, 10, and 11 are amended to delete their reference to disclosed feature (ii). Claim 15, which was limited to feature (ii), is cancelled, without prejudice. Claim 18 is amended to delete a superfluous phrase and thereby to overcome a formal rejection of the claim. No new matter is introduced by this Amendment. Claims 2, 8-13, and 16-18 remain in the application.

Claims 2, 8-13, and 16-18 were rejected under the second paragraph of 35 U.S.C. § 112. The Examiner alleges that the claims embrace subject matter that does not share a common utility and that does not share a substantial structural feature disclosed to be essential to that utility, and that accordingly the claims involve improper Markush groups. It is respectfully submitted that this ground of rejection is not applicable to the present claims, particularly as they are amended hereinabove.

MPEP 2173.05 (h) states that:

... when the Markush group occurs in a claim reciting a process or a combination ..., it is sufficient if the members of the group are disclosed in the specification to possess at least one property in common which is mainly responsible for their function in the claimed relationship....

Each of claims 2, 8-13, and 16-18 herein relates to a diffusion apparatus that has a solvent inlet tube connected to a solvent outlet tube through a means that promotes diffusion of a liquid. The Markush group in the claims now joins just two different classes of embodiments of the liquid diffusion means: (i) those in which a solvent inlet tube and a solvent outlet tube have different inner diameters, and (iii) those in which a solvent outlet tube is connected to a solvent inlet tube by a connecting part having a diameter that is

larger than the diameters of the diameters of the solvent inlet tube and the solvent outlet tube.

Regardless of whether or not the Examiner considers that these features share sufficient structural attributes, it is clear that they possess at least one property in common (diffusion promotion) which is mainly responsible for their function in the claimed relationship. This alone is sufficient to satisfy the standard set forth in the Manual of Patent Examining Procedure.

However, in fact, the Markush group in question now clearly does have a significant shared structural attribute – namely, variations in diameter. Accordingly, the Examiner is respectfully requested to withdraw this ground of rejection.

Claim 18 was rejected under the second paragraph of 35 U.S.C. § 112. The Examiner indicated that the phrase “low flow velocity gradient high performance liquid chromatography apparatus” lacked proper antecedent basis. The phrase has been modified so that claim 18 in its present form finds full antecedent basis in claims 8, 10, and 11 from which it depends.

**THE PRESENT INVENTION.** The present invention distinguishes over the prior art of record by placing the diffusion promoting device just before the separation column. This permits a sample being analyzed to be retained uniformly at the beginning end of the separation column. The sample is diffused or dispersed uniformly by way of the diffusion promoting device before the separation column and it can be treated uniformly in the separation column. A sufficient concentration of the target compound in an eluent can thus be obtained to effect a gradient elution.

The present invention provides a diffusion promoting device provided just before a separation column and having a function of improving detection sensitivity, in a low flow velocity high performance liquid

chromatographic apparatus. The present invention also provides a method for improving detection sensitivity of a target component for use in a low flow velocity gradient high performance liquid chromatographic apparatus, wherein a diffusion promoting device is provide just before a separation column.

Specification, page 6, 2<sup>nd</sup> and 3<sup>rd</sup> full paragraphs. Thus the presently claimed inventions are all characterized by placing a diffusion-promoting device (DU) just before a separation column (C) in a liquid stream line. This enables specimens to enter into the separation column with uniformity, thus providing chromatographic results with unexpectedly improved sensitivity.

Claims 2, 8, and 16-18 were rejected under 35 U.S.C. §102(b) as being anticipated by, or in the alternative, under 35 U.S.C. §103(a) as being unpatentable over, US 4,475,821 (Koch). Koch neither teaches nor suggests that placing a diffusion-promoting device (DU) just before a separation column (C) in a liquid stream line enables specimens to enter into the separation column with uniformity, and thus provides chromatographic results with unexpectedly improved sensitivity. Accordingly, it is respectfully requested that these grounds of rejection (over Koch alone) be withdrawn.

Claims 2, 8-13, and 16-18 were rejected under 35 U.S.C. §103(a) as being unpatentable over US 5,117,109 (Asakawa) in view of Koch. Asakawa neither teaches nor suggests that placing a diffusion-promoting device (DU) just before a separation column (C) in a liquid stream line enables specimens to enter into the separation column with uniformity, and thus provides chromatographic results with unexpectedly improved sensitivity. As noted above, Koch too is deficient in these regards. It is additionally noted that in Asakawa, the pipe before TC is larger than the other pipe. Column 6, line 30. This means that the pipe 36 in Figure 1 is larger. The pipe 36 is followed by

the trapping column (TC), the valve (V4), and the pipe 39 before arriving at the separation column (C3). This does not constitute "just before" as recited in the present claims. Accordingly, it is respectfully requested that this ground of rejection (over Asakawa in view of Koch) be withdrawn.

Claims 12 and 13 were rejected under 35 U.S.C. §103(a) as being unpatentable over Asakawa and Koch in view of *Introduction to Modern Liquid Chromatography* (Snyder). The deficiencies of the Asakawa and Koch references are noted above. Snyder does not remedy those deficiencies. Accordingly, it is respectfully requested that this ground of rejection (over Asakawa in view of Koch and Snyder) be withdrawn.

ANALYTICAL SUMMARY. The present claims all require at least one feature – feature (i) or feature (iii) – which enables a sample to be retained uniformly at the end of a separation column. As a result, the number of ideal stages of the separation column and the shape of the peak obtained thereby are unexpectedly improved. This is a reason for unobviousness of the claimed invention. No prior art of record, alone or combined, teaches or suggests anything about these features of the present invention and the advantages thereof.

#### Conclusion

If the Examiner has any questions concerning this application, he is requested to contact Richard Gallagher, Reg. No. 28,781, at (703) 205-8008.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit

Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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